Geophysical Research Abstracts
Vol. 14, EGU2012-3604, 2012
EGU General Assembly 2012

Regional Ionosphere Modeling using Multivariate Adaptive Regression B-Splines (BMARS)

M. O. Karslioglu (1,2) and M. Durmaz (2)

(1) Middle East Technical University, Civil Engineering, Department of Geomatics Engineering, 06800 Ankara, Turkey, karsliog@metu.edu.tr, (2) Middle East Technical University, Institute of Applied and Natural Sciences, Department of Geodetic and Geographic Information Technologies, 06800 Ankara, Turkey,murat.durmaz@gmail.com

In this study spatio-temporal character of the Vertical Total Electron Content (VTEC) is investigated using Multivariate Adaptive Regression B-Splines (BMARS) on the basis of a regional GPS network. As a kind of non-parametric regression BMARS makes use of the basis functions which are compactly supported tensor product B-splines obtained directly from the observations. Therefore BMARS can be applied to regional VTEC modeling and does not need a separate regularization step in the algorithm. This is referred to its adaptivity which uses a scale-by-scale model building approach where the candidate basis functions are searched from large scales to smaller ones. This strategy in turn searches for splines at each scale fitting adequately to the data resulting in smoother approximations than the original Multivariate Adaptive Regression Splines (MARS). Another advantage of BMARS is to process large amount of data with arbitrary dimensiones. The algorithm constitutes the regression function in two stages. In the forward stage the model overfits the given data while in the backward stage the least significant terms are eliminated from the previous model. By this a minimum value for the Generalized Cross Validation (GCV) is achieved which is an estimation of the prediction error. The real test data is collected from a regional ground based GPS network. The results are compared numerically and visually with another regional VTEC modeling using tensor product quadratic B-splines.